

CENTER FOR REMOTE SENSING AND ENVIRONMENTAL ANALYSIS

Department of Geography
College of Humanities and Social Sciences

SELF-STUDY/PROGRAM REVIEW (2012–2015)

Director: Jindong Wu, Associate Professor

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Center Location: H-419

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I. Mission and Goals

The Center for Remote Sensing and Environmental Analysis (CRSEA) employs satellite imagery and other remotely sensed data to obtain information about the surface of the Earth, and to analyze and model biophysical environmental change. CRSEA supports student learning with relevance both for careers and advanced graduate study, provides an image processing and computation facility for faculty and student research, enhances faculty and student recruitment, and offers new opportunities for seeking grants, contracts, and philanthropic donations in support of faculty and student research.

The primary goals of CRSEA are:

- To establish and maintain a well-equipped remote sensing facility and relevant curriculum that will attract high-quality undergraduate and graduate students to California State University, Fullerton (CSUF);
- To create an undergraduate student learning center that will qualify our graduates for careers in the rapidly-growing and increasingly applicable field of geospatial analysis;
- To encourage Masters-level students from a range of disciplines—geography, environmental studies, and others—to integrate remotely sensed data into their research;
- To provide a technologically-advanced remote sensing laboratory for cooperative research on environmental problems between faculty and graduate students;
- To establish a facility for cooperative research enterprises between CSUF faculty and environmental stakeholders—local, state, federal, and private.

CRSEA directly supports the missions of Geography department in offering courses and research opportunities in environmental analysis and application of geospatial technology, particularly remote sensing.

The mission and goals of CRSEA are well-aligned with the University Strategic Plan for maintaining academic excellence. In particular, CRSEA strives to attain the following CSUF Mission and Goals:

Goal 1: Develop and maintain a curricular and co-curricular environment that prepares students for participation in a global society and is responsive to workforce needs.

Goal 2: Improve student persistence, increase graduation rates University wide, and narrow the achievement gap for underrepresented students.

The growing demand for remote sensing expertise has been tremendous in recent years, extending to the private, governmental, and academic sectors. CRSEA provides advanced education and training for graduate and undergraduate students who will become the next generation of environmental scientists and geospatial professionals (Goal 1). CRSEA prompts student active learning that links degree and career, thus preparing them for success. Students are directly engaged with High-Impact Practices, such as participation in research investigations, to improve student retention and graduation (Goal 2).

II. Activities

Curricular Development

CRSEA provides students with a well-rounded education by offering a breadth of remote sensing and affiliated environmental analysis courses at 100-, 300-, 400-, and 500-levels. These courses prepare students with knowledge and skills in understanding Earth's physical environment and analyzing complex environmental issues.

Remote Sensing Courses:

- GEOG 486 Environmental Remote Sensing (Newly Proposed and Approved)
- GEOG 489 Digital Image Processing (Newly Proposed and Approved)
- GEOG 530T Monitoring Ecosystem Processes (Newly Proposed and Approved)

Affiliated Environmental Analysis Courses:

- GEOG 110 Introduction to the Natural Environment (Newly Renamed and Approved)
- GEOG 120 Global Environmental Problems
- GEOG 325 Natural Vegetation
- GEOG 328 Global Change and Environmental Systems (Newly Proposed and Approved)
- GEOG 425 Tropical Rainforests
- GEOG 520 Seminar in Physical Geography

Research

Between 2012 and 2015, the following research projects were initiated and carried out by CRSEA faculty and students.

- Using Satellite Imagery to Examine and Predict Habitat Niche Differences between Two Sympatric Species of Rattlesnake in Southern California
- Monitoring Salton Sea Water Surface Change with Landsat Imagery
- Urban Tree Inventory and High-Resolution Satellite Imagery-Based Mapping
- Evaluating the Potential Impact of the Proposed Land Development on Coastal Sage Scrub in Northern Orange County
- Colony Dynamics of Elegant Terns (*Thalasseus Elegans*) in the Southern California Bight in Relation to Prey Availability, Oceanographic Conditions, and Predator Disturbance
- Using Participatory Geographic Information Systems to Assess the Conservation Status of a Threatened Medicinal Plant Species in Southern Mozambique
- Traditional African Medicinal Treatment of HIV/AIDS in Mozambique: The Biogeography and Ethnobotany of the African Potato (*Hypoxis hemerocallidea*)

Community Engagement

CRSEA has been actively engaged with intramural and extramural communities. Both directors have been serving on the Environmental Studies Program council. Dr. Wu

served on the Research and Grants Committee of the College of Humanities and Social Sciences in 2015.

Extramurally, Dr. Voeks has been the Editor-in-Chief of *Economic Botany* since 2008 and served as President of the California Geographical Society. Dr. Wu has served as a reviewer for all major journals in the field of remote sensing. He has also served as a Faculty Mentor for high school students in the Troy Tech Magnet Program in Science, Mathematics and Technology. Five students from this program have conducted research in CRSEA. At the Association of American Geographers 2013 Annual Meeting, Dr. Wu chaired a paper session on *Remote Sensing and Vegetation*.

III. Organizational Structure and Governance

Housed within the College of Humanities and Social Sciences, CRSEA is affiliated with the Department of Geography and the Environmental Studies Program. As an interdisciplinary center, it has attracted participation from interested faculty and students campus wide, in particular from the College of Natural Science and Mathematics, the College of Engineering and Computer Science, and the College of Business and Economics. CRSEA faculty has collaborated with colleagues across campus and served on various Masters' thesis committees.

Although CRSEA currently operates without a formal advisory board, we intend to set up one in the near future. The Advisory Board will consist of the Chair of the Geography Department, the Coordinator of the Environmental Studies Program, one or two faculty members from each participating CSUF college, one Center graduate assistant or post-doctoral fellow, and up to three community representatives—faculty members from other universities, independent remote sensing specialists, resource agency scientists, employees of private environmental consulting firms, etc.

IV. Resources and Sustainability

The Center is administered by a Director and an Associate Director. Currently, Dr. Wu serves as Director and Dr. Voeks as Associate Director. CRSEA is located in H-419 consisting of a dedicated teaching laboratory and a research facility.

CRSEA operates on “soft money” with no baseline budget support. Between 2012 and 2015, CRSEA received eight internal grants worth \$32,666 and two 3-WTUs assigned time. Dr. Voeks received a Fulbright Fellowship to Mozambique for the 2013/2014 academic year. We have been proactively seeking external funding opportunities by submitting research grant proposals to federal agencies such as NSF.

The Center was established in 2007 with the support of a grant from NASA and matching funds provided by the College of Humanities and Social Sciences. Computers and workstations may need to be replaced and upgraded every few years when the cost of maintaining hardware outweighs the benefit of keeping old machines. Most software used in the Center has been provided through the CSU system-wide licenses, although we have acquired and will seek funds from the College of Humanities and Social Sciences to support other essential software.

V. Highlights and Accomplishments

Between 2012 and 2015, CRSEA fulfilled its mission and goals through a variety of research, teaching, advising, and community engagement activities. CRSEA published 14 peer-reviewed articles (in some of the leading journals such as *Human Ecology* and *Remote Sensing*) and book chapters and one book. Among them, four papers were co-authored with students. During the same period, CRSEA faculty and students also presented numerous papers at regional, national, and international conferences.

Over the years, CRSEA has attracted some of our best undergraduate and graduate students and provided them with high-quality education in environmental remote sensing. Eleven geography M.A. students and eight Environmental Studies M.S. students have worked on their theses in the Center. Among them, CRSEA directors have served as the thesis adviser for ten M.A. students and one M.S. students, and as an advisory committee member for other nine graduate students. Additionally, a number of undergraduate and graduate students participated in various research projects through Independent Studies.

One of CRSEA graduate students won the best physical geography paper award at California Geographical Society's annual meeting. Another graduate student was selected as a Sally Casanova Scholar for Chancellor's Office California Pre-Doctoral Program. Upon completion of their degrees, CRSEA students have started their career in a range of relevant fields including non-profit organizations, remote sensing companies, teaching, government environmental planning offices, or pursuing doctorate degrees, etc.

VI. Planning and Strategic Outlook

The first step in the strategic planning of CRSEA is to set up an advisory board. Members of the advisory board will be carefully selected to ensure that the board is effective and can help the Center grow and meet the challenges ahead.

Over the next three years, under the guidance of the Advisory Board and CRSEA directors, the Center will concentrate on achieving the following:

- Identify CSUF faculty interested in remote sensing and create of a formal research group of CRSEA affiliated faculty
- Promote more across college collaboration to attract high-quality students with science and engineering background
- Engage with local communities and link classroom education to remote sensing practice
- Continue seeking research funding through public agencies and private foundations